INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Define Finite Automata mathematically, with its pictorial diagram and explain its functionality in detail.   [6]
Q.1(b)   Design a DFA that will recognize strings over Σ = {0,1} that starts with 010 or 101 and ends with 110.   [6]

Q.2(a)   Prove following identity: [6]
         $\Phi R = R\Phi = \Phi$
Q.2(b)   Write Regular Expression for string ends with 10 over Σ = {0,1}, and from the written RE derive the   [6]
         corresponding DFA

Q.3(a)   Write a Grammar that will generate assignment statement of C Programming language. Use '+' and '*'   [6]
         operators only.
Q.3(b)   What do you mean by Chomsky Normal Form of Grammar? Explain with suitable example.   [6]

Q.4(a)   Design a Grammar that will generate strings of form $a^n b^n c^n$, n>= 0.   [6]
Q.4(b)   To recognize strings of form mentioned in question 4.a, which abstract machine will be appropriate.   [6]
         Explain it with its pictorial diagram.

Q.5(a)   What is the relation between a Pushdown automata and the abstract machine which you have mentioned   [6]
         in answer of question 4.b? Justify.
Q.5(b)   Design a Pushdown Automata that will recognize string that contains equal number of 0's and 1's.   [6]

Q.6(a)   Give mathematical definition of Turing Machine with proper block diagram.   [6]
Q.6(b)   Design a Turing machine that will perform subtraction operation on unary numbers.   [6]

Q.7(a)   A Turing Machine will halt for a given input. Can we write algorithm to check it? Describe.   [6]
Q.7(b)   Write short note of Recursive enumerable language.   [6]

******28.11.18******M